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A PSYCHOLOGICAL REACTANCE PERSPECTIVE ON THE TIME AND FUNCTIONALITY RESTRICTIONS OF FREE TRIAL SOFTWARE: ARE YOU WILLING TO EVALUATE THE SOFTWARE?

Social, Behavioral and Organizational Aspects of Information Systems

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Abstract

In order not to cannibalize the sale of software, software firms often place restrictive interventions on the usage of the free trial software (FTS). The two most commonly adopted approaches are time and functionality restrictions. Building on psychological reactance theory and expectation-disconfirmation theory, this study seeks to investigate the influence of time and functionality restrictions on users' attitudinal and behavioral responses when the restrictions are either more adverse or favorable than initially expected. Our survey results indicate that when a user perceives the restrictions to be less (more) adverse than anticipated, he/she is more likely to formulate higher (lower) expected value of the FTS and attitude toward the software firm, which in turn positively (negatively) influence perceived effort devoted to the trial process. Concerning behavioral responses to time restriction, we observe that users are less likely to devote and perceive higher effort toward using the FTS when they are given shorter evaluation time. In addition, the influence of time restriction on perceived effort is positively moderated by the accessibility of one's perceived resources. We also establish that perceived effort positively affects the switching cost of a user to switch from a current FTS to other software.

Keywords: Free trial software, restrictive interventions, expectation-disconfirmation theory, psychological reactance theory

Introduction

Software is an experience good for which a buyer could only gauge its quality after usage. One way to address this concern is to provide users the free trial version before committing to a purchase (i.e., potential consumers could evaluate the quality of the software to gauge its worth without making any purchase commitment) (Kempf and Smith 1998). We call such software as free trial software (FTS). On the one hand, the presence of a free trial enables software users to dispel quality uncertainty and reduce risk related to first-time purchase (Rogers 1995), which in turn influences one's brand beliefs, attitudes and purchase intentions (Smith 1993; Wright and Lynch 1995). On the other hand, FTS could also affect software firms by cannibalizing the demand for full-functional, paid software (Gallaugher and Wang 2002; Tang 2003). To mitigate the risk of losing the potential revenue from non-purchase by

users who have engaged in free trial, software firms often attempt to place restrictive interventions, including time restrictions and/or functionality restrictions, on the FTS.

While restrictive interventions (i.e., imposing time and/or functional restrictions) can differentiate the paid software from FTS, users may view such restrictions as threats to the freedoms (Brehm 1966) or control (Brehm and Brehm 1981) they should have (i.e., anticipated) in order to evaluate the software (Knowles 1975). In this light, imposing restrictions that are more adverse than expected may negatively affect a user's ability to evaluate the software (Garrison 2003). To our knowledge, the literature on FTS is scarce, and little is known on how users' trial attitude, behavior and post-trial decision making can be influenced by trial restrictions. This research, hence, seeks to answer this question: how do users formulate attitudinal responses and behavioral responses to the unexpected restrictions and to what extent will the attitudinal responses further influence trial behavior?

To seek an answer to the question, we first build on the expectation-disconfirmation theory (Oliver 1980) and the psychological reactance theory (Brehm and Brehm 1981) to conjecture that psychological reactance may be elicited by the disconfirmed perception of restriction (i.e., whether the restriction is perceived to be more or less adverse than expected) in evaluating software (Brehm and Brehm 1981). We next construct a theoretical model hypothesizing that the degree of negative (positive) disconfirmation on the restrictive interventions will influence users to move in two ways. From the attitudinal perspective, it may dampen (heighten) one's value estimation over the trial product and increase (lower) the negative feelings toward the trial provider (e.g. software firm). From the behavioral perspective, the unexpected stronger (weaker) restrictions may motivate (discourage) users to intensify the FTS evaluation in a more proactive manner. Furthermore, whether greater effort will be devoted or not will be influenced by one's attitudinal responses toward the situation and perceived resource availability in facilitating the behavior (Ajzen 1991; Mathieson 1991; Taylor and Todd 1995). We also posit that the perceived effort will directly influence the perceived degree of switching cost related with propensity to retain or abandon the FTS for another software.

An online survey was conducted subsequently in a local university to examine the theoretical model. We observe that when a user perceives the restrictions to be less (more) adverse than anticipated, he/she is more likely to formulate higher (lower) expected value of the FTS and attitude toward the software firm, which in turn positively (negatively) influence perceived effort to be devoted to trial process. Concerning the behavioral response to time restriction, the results indicate that users are less likely to devote higher effort toward using the FTS when they are given shorter evaluation time. In addition, the influence of time restriction on perceived effort is positively moderated by one's perceived accessible resources. We also establish that perceived effort affects the switching cost of a user to switch from the current FTS to other software.

Theoretical Background and Research Model

In the current study, we define free trial as a self-directed process in which "individuals take the initiative, with or without the help of others, in diagnosing their needs, formulating trial goals, identifying human and material resources for trial, choosing and implementing appropriate trial strategies and evaluating trial outcomes" (Knowles 1975, pp. 18). During the free trial period, users would decide what to learn, and when and how to evaluate the FTS as well as assess whether the trial activities are relevant to their objectives (e.g. effective assessment) (Guglielmino and Guglielmino 2001). It is plausible that when the software is too restrictive, overall software assessment quality is lowered (Kempf and Smith 1998). When the FTS fails to meet the users' original expectation of the FTS in facilitating the smooth and complete estimation of the paid software, discrepancy occurs. According to Expectation-Disconfirmation theory (EDT) (Oliver 1980, 1993), such discrepancy is termed as *disconfirmation.* Disconfirmation may be positive or negative depending on whether the restrictions of the FTS are above or below initial expectation (Bhattacherjee and Premkumar 2004; Szajna and Scamell 1993). Prior research indicates that disconfirmation has a significant influence on subsequent user belief and satisfaction (Yi 1990), which in turn affects the propensity to continue using a product (Bhattacherjee 2001; Bhattacherjee and Premkumar 2004; Mckinney et al. 2002; Yi and La 2004). The next question to ask is how would a user react when the disconfirmation related to one's freedom occurs?

Inferring from Psychological Reactance Theory (PRT), we could speculate that imposing the restrictions may result in users experiencing a state of negative feeling called *psychological reactance* (Brehm 1966; Wicklund 1974). Psychological reactance refers to a motivational state which may occur whenever certain behavioral freedoms are threatened or lost and will lead to devising responses to counter the threat (Brehm and Brehm 1981). People normally prefer to have freedom to think, feel and act (Donnel et al. 2001). *Free* behavior in terms of specific

freedom refers to the expectancy that one could engage in a particular behavior with a particular degree of strength and importance (Brehm and Brehm 1981). Any force on the individual that may impede him/her performing the freedom (e.g. restriction on trial time and/or functionality) constitutes a threat to the freedom. The perceived threat to freedom will be greater when the forces against fulfilling the freedom increase (Brehm and Brehm 1981). Such forces will interact with the perceived importance of freedom to produce different degrees of reactance. For instance, prior studies suggest that humans have a tendency to behave (i.e., react) differently from original intent when unsolicited recommendations are provided (Fitzsimons and Lehmann 2004), the product to be procured is "out of stock" (Fitzsimons 2000), rewards are offered in promotion (Kivetz 2005), or there is social pressure to confront (Burgoon et al. 2002).

In the current context, we assume the availability of trial time and functionality to be significantly important for users during the free trial process as the restrictions could hinder learning freedom (Fitzsimons and Lehmann 2004; Rogers 1969; Tough 1971). While certain restrictions are always attached with the FTS offered, they have different representations. Some conditions of the restrictions are relatively looser than the others (e.g. 30 versus 10 days' free trial). An individual will likely form an expectation toward the restrictions ex ante for the prospective FTS based on prior exposure. To this end, certain behavioral freedom is embedded in one's mind, serving as a reference level against which the individual has the belief of being able to control his/her trial activities. By comparing the provided restrictions with one's expectations, certain disconfirmation (positive or negative) will result. We, hence, propose a theoretical model in which psychological reactance will occur along with negative disconfirmation and will result in various attitudinal and behavioral effects, while the effects of positive disconfirmation will also be discussed. We define the disconfirmation on restrictions as ranging from negative to positive in general. We further hypothesize the influence of perceived effort as a result of behavioral response on switching cost, which is the dependent variable in this research. Figure 1 depicts the research model, and further elaboration on hypotheses will follow in the next section.

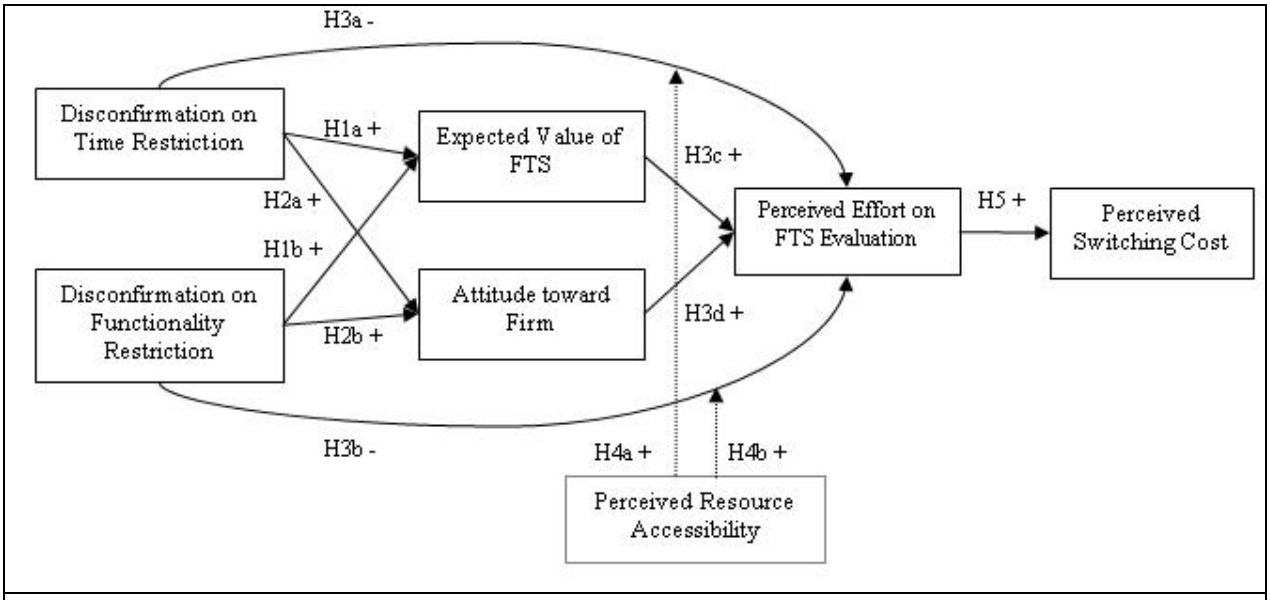


Figure 1. Research Model

Attitudinal Reactance Effects

Attitudinal reactance refers to the changes of one's feeling, belief and attitude in response to the threat to or loss of one's behavioral freedom. We posit that when the restrictions are more (less) strict than originally expected and the direct ways to restore the expected freedom are not feasible (e.g. cracking the FTS risks a lot of time, effort and even punishment for lawbreaking), a user is more likely to have lower (higher) expected value of the FTS in terms of its ability to facilitate effective product assessment and more negative affect on the software firm.

Expected Value of FTS

As the most direct subjective effects, one's interest and concerns regarding the restricted freedom will be enhanced when reactance occurs as a result of one's behavioral freedom being restricted (Fitzsimons and Lehmann 2004). The threatened behavior or thoughts will be perceived as relatively more or less attractive and desired by the individual (Brehm and Brehm 1981). Thus, one will conduct reevaluation toward the expected value of the object which possesses certain restrictive features. According to the expectancy-value (EV) model (Fishbein and Ajzen 1975; Smith 1993), the expected value of the product is mainly represented by the evaluation on salient product attributes (Fishbein and Ajzen 1975; Smith 1993; Smith and Swinyard 1988). In this study, the expected value of FTS refers to the predicted ability of the FTS with certain trial restrictions to facilitate effective software assessment. Thus, the expected FTS value will decrease (increase) with the decrease (increase) of disconfirmation which ranges from positive to negative on trial restrictions. More specifically, increase of negative disconfirmation on freedom restriction will make the eliminated freedom more attractive and decrease the expected value of the restricted FTS. For the user who gets greater time restriction than expected, he/she will perceive a longer trial as more attractive. Similarly, the functionalities being disabled unexpectedly will appear as more important for the test. In such situations, the user will anticipate less satisfied trial outcomes (e.g. direct and comprehensive software assessment) and the FTS tends to lose its original appeals. Therefore, while the additional restricted trial time or functionalities become more valuable, the expected value associated with the FTS will decrease even before one practically engages in the trial process. In contrast, when the current restrictions are positively disconfirmed, the individual's cognitive evaluation toward the object (e.g. expected value) will be more favorable than otherwise (Oliver 1997), as hypothesized:

> ***H1a:*** *The greater the negative (positive) disconfirmation on the time restriction, the lower (higher) the user's expected value of the current FTS offer will be.*
>
> ***H1b:*** *The greater the negative (positive) disconfirmation on the functionality restriction, the lower (higher) the user's expected value of the current FTS offer will be.*

Attitude toward the Firm

Consumers may form different evaluations on the software firm's image, such as trustworthiness, helpfulness and friendliness (Gurhan-Canli and Batra 2004), based on the usage of the firm's product (Keller 2003). In other words, the product attribute evaluations, either positive or negative, will have direct impact on the individual's assessment of the firm (Herr et al. 1991). Presumably, a consumer's attitude toward the firm is negative when the firm's product is perceived to be of inferior attributes (Folkes and Kamins 1999). Likewise, according to reactance theory, the reactance arousal can bring about negative feelings such as hostility toward the agent (e.g. software firm) who has eliminated or threatened one's behavioral freedom (Brehm 1966; Clee and Wicklund 1980).

In relating to current context, the perception that the software firm confines the free trial valid period and/or testable functionality more strictly than expected will probably make users feel it more difficult to fulfill trial goals. For instance, strict restriction on trial time greatly decreases the probability to fully assess the software within permitted period. The restriction on functionality prevents users to try the software by using directly. According to attribution theory (e.g. Weiner 1985, 1992), possible future trial failure (e.g. insufficient software assessment) under such controllable circumstances will likely to be attributed to restrictions imposed on the FTS by the firm. Likewise, the reactance may be increased through the implication of current restrictions on the firm's future ungenerous treatment (e.g. unsatisfactory after-sales customer service or technical report). In this light, reactance elicited by negative disconfirmation on the restrictions could induce a negative attitude toward the software firm. Oppositely, when the anticipation of free trial allowance is exceeded, the relatively looser restrictions will be viewed as favorable and one's attitude toward the firm will be positive. Hence, an individual's attitude toward the firm will be positively determined by the degree of disconfirmation on trial restrictions through the intermediary of psychological reactance, as hypothesized:

> ***H2a:*** *The greater the negative (positive) disconfirmation on the time restriction, the more negative (positive) the user's attitude toward the firm who offers the current FTS will be.*
>
> ***H2b:*** *The greater the negative (positive) disconfirmation on the functionality restriction, the more negative (positive) the user's attitude toward the firm that offers the current FTS will be.*

Behavioral Reactance Effect

When one's expectation is not fulfilled, the psychological reactance arousal may induce direct or indirect behavioral efforts to restore the freedom (Brehm and Brehm 1981), such as making choices contrary to the unsolicited recommendation (Fitzsimons and Lehmann 2004; Burgoon et al. 2002). It is to be noted that direct control restoration may be obstructed by high cost (e.g. Feldman-Summers 1977) and difficulties of execution (GÖtz-Marchand et al. 1974). To this end, the self-directed characteristic of free trial determines that the user could conduct self-regulative activities to indirectly restore the threatened trial freedom (e.g. Knowles 1975; Zimmerman 1998), such as devoting more effort. In addition, the ability to modify trial behaviors also depends on the perceived resource availability to facilitate product assessment (e.g. Skinner 1995). In similar manner, the willingness to proceed with further evaluations can be influenced by the attitudinal responses toward the restriction disconfirmation. According to consumer commitment and retention literature, the perceived switching cost related with giving up current software will be impacted by the total effort spent and in turn probably influences the switching intention (Chen and Hitt 2002; Thatcher and George 2004).

Perceived Effort on FTS Evaluation

In accordance to the PRT, individuals will seek more control in a particular noxious situation such as the loss or reduction of control over important outcomes (e.g. Mandler 1972). Reflected in behavioral response, energizing and behavior-directing activities could occur with intensive desire to restore the behavioral freedom (Brehm and Brehm 1981). Furthermore, previous research on goal intention has shown that in specific situational contexts (e.g. stronger restrictions than expected), certain salient goals will be formulated to motivate particular active endeavors (Abraham and Sheeran 2003; Dweck 1999). Since all actions are given meaning, direction and purpose by the goal, the quality and intensity of the behavior will have to be consistent in pursuing the goal (Covington 2000).

The excessive trial restrictions below expectation are supposed to threaten the accomplishment of free trial goals (i.e., able to fully assess the software) (Schunk 1996; Schunk and Swartz 1993). According to psychological reactance theory, such learning-goal orientation will favor self-regulated activities (Ames 1992; Pintrich and Schrauben 1992) which involve deeper-level and more strategic information processing, greater persistence and thus demand greater effort (Covington 2000). In this sense, the cognitive effort spent across the trial process will be thought as the key for effective FTS evaluation (Pintrich and Schunk 1996; Schunk 1996). After regulating the trial activities to achieve thorough software assessment, the user will more likely to perceive significantly greater effort being devoted than otherwise.

For the case of higher degree of time restriction than prior anticipation, the user will anticipate less available time to processing any information related to the product features prior to making a decision (Nelmapius et al. 2005). Motivated to achieve the trial goal through reactance arousal, the user will likely increase the frequency and intensity of FTS usage to overcome the trial time shortage. The user will perceive a better utilized trial period as the user tries harder to grasp any moment available. Thus, the shorter and more intensive the trial period, the more likely the user will feel that he/she has invested relatively more effort than otherwise to test the FTS.

Likewise, disabled functionalities of the FTS beyond one's expectation constitute additional incomplete information and missing values of the product attributes (Kivetz and Simonson 2000). To regain control of the FTS evaluation, the individual could expend additional effort to search for more information through various sources (e.g. help document or instructions). The additional search could compensate for the deficit of the inability to try through sensory contact with the software. The disabled functionality may, in our view, attract users to explore further. After conducting an additional information search to learn the software, a user could perceive that he/she has spent extra effort to test the FTS, since he/she may not do so with complete functionality.

When the restrictions are looser than the expectation, it is plausible that total effort to be invested on assessing the FTS will increase because of the longer trial time offered and the more software components available to be examined. However, the perception of more trial freedom empowered or greater control at hand may release users from the worry of insufficient assessment. Such an impression could result in the user reducing the original attention paid to carrying out the trial. As a result, overall FTS usage may be casually performed and be perceived with relatively less effort devoted. Hence, we expect a negative relationship between the disconfirmation on restrictive interventions and the perceived cognitive effort expended over the whole trial period, as hypothesized:

> ***H3a:*** *The greater the negative (positive) disconfirmation on the time restriction, the more (less) the user's perceived effort on the FTS evaluation will be.*

H3b: *The greater the negative (positive) disconfirmation on the functionality restriction, the more (less)the user's perceived effort on the FTS evaluation will be.*

Furthermore, the higher degree of expected FTS value is supposed to motivate the user to test the FTS, since the user believes that the FTS could support effective future evaluation activities. The different degree of attitude toward the firm can similarly make the user either more or less willing to assess the firm's FTS enthusiastically. Consequently, the actual effort committed to the trial process determines the perception of trial effort in a positive manner. Hence, we hypothesize that:

H3c: *The user's expected value of the current offer of FTS will positively influence the user's perceived effort on the FTS evaluation.*

H3d: *The user's attitude toward the firm that offers the current FTS will positively influence the user's perceived effort on the FTS evaluation.*

Perceived Resource Accessibility

According to cognitive motivation literature, the belief about resources availability for task engagement and outcome achievement is a critical factor to influence motivations and execution of goal-directed activities (Eccles and Wigfield 2002; Shunk 2000). It could help the individual judge how likely he/she would be able to achieve desired outcomes (e.g. comprehensive software assessment) in the prospective situations (i.e., highly restricted valid period for trial) (Bandura 1997). Normally, the belief of resource availability can interact with the external forces to influence subsequent reactions (e.g. Maier and Seligman 1976).

Additionally, empirical evidence shows that when people perceive greater facilitation, they tolerate aversive situations (e.g. more strict restrictions on FTS) better and perform at a higher level (e.g. Glass and Singer 1972). Those who believe they could have support for their behaviors and the consequences of their actions will be more apt to initiate and sustain behaviors directed toward those ends (Shunk 2000). In contrast, extremely serious disturbances in one's behaviors without necessary facilitation can lead to learned helplessness and passivity toward the situation (Brehm and Brehm 1981; Seligman 1975). Thus, perception of resource scarcity will dampen one's enthusiasm to engage in the task processing (Bandura 1997) and following perception on degree of engagement.

Applied to the current context, the trial user's availability or personal free time to evaluate and learn the FTS is regarded as the most important resource to conduct an effective FTS test. With limited spare time for trial, the user will be discouraged to better assess the FTS or attempt to engage in more information search. Essentially, less perceived effort is spent. In other words, the more accessible the resource (e.g. spare time), the more significant the negative relationship between restriction disconfirmation and perceived effort. Hence, we hypothesize that:

H4a: *The degree of perceived resource accessibility will positively moderate the relationship between negative (positive) disconfirmation on time restriction and more (less) perceived effort on the FTS evaluation.*

H4b: *The degree of perceived resource accessibility will positively moderate the relationship between negative (positive) disconfirmation on functionality restriction and more (less) perceived effort on the FTS evaluation.*

Switching Cost

Switching cost reflects the belief of costs to be incurred when switching to another vendor or product (Srinivasan 1996). Higher switching cost will indicate higher commitment to a vendor or a product (Thatcher and George 2004) and lower switching intention (Chen and Hitt 2002), which is crucial to make FTS users retain and purchase for continuous usage. Since FTS entails no acquisition cost and no contractual cost, the learning cost becomes the most predominant component of switching cost related to shifting from current software to others (Shapiro and Varian 1999).

Learning cost is the belief about the effort or resources expended in order to be familiar with and to acquire the skills required to assess the product (Shapiro and Varian 1999; Watson et al. 1998). In product learning, FTS serves as an informational function to understand the attributes associated with the product (Kempf and Smith 1998). In this light, a user expending greater effort toward using the FTS could achieve higher achievements regarding understanding the software (Covington 2000). At the same time, the increase of evaluation effort leads to an increase in the

perception of future learning cost. It helps the user predict the necessary effort to reach the same level of familiarity with new software as he/she has for the current FTS (e.g. Chen and Hitt 2002). Hence, the perceived effort spent on evaluation is probably a positive determinant of perceived switching cost to alternatives, as hypothesized:

> ***H5:*** *The user's perceived effort on the FTS evaluation will positively influence the perceived switching cost in abandoning the current software product.*

Through providing free trial, software firms are predominantly concerned about whether they can successfully persuade users to buy. The degree of switching cost implies the economical and/or psychological lock-in toward the specific software (e.g. Johnson et al. 2004) and can be deemed as one of the important determinants of the purchase intention (e.g. through the user's commitment) (Chen and Hitt 2002; Thatcher and George 2004). In addition, other factors such as usefulness, product price or alternative availability may have an impact on the purchase decision. The relative weight of the switching cost thus cannot be simply estimated. With this consideration, this study will only examine the switching cost as the dependent variable.

This study focuses on controlling two personal factors due to their potential significant influence on the perceived switching cost as posited by prior consumer behavior research. The first is dispositional innovativeness, a consumer trait, which refers to the predisposition to try new products and brands rather than remain with the previous choice (i.e., status quo) (Steenkamp and Gielens 2003), which will negatively influence the perceived switching cost. The second is inertia, which could inhibit changes in behavior and result in hesitancy to try new product options (Gremler 1995) and which will positively influence the perceived switching cost.

Research Methodology

Factorial Design and Manipulations

We conducted an experimental survey to test the research model. Respondents were required to answer questions based on this scenario:

"You have to purchase a specific software program for daily use because there is no suitable free software to choose. After searching online, you find one product SW offered by the software firm ABC that may meet your requirements. Before you decide whether to buy it or not, you download the free trial to try and find there are restrictions attached with the free trial version."

The definitions and general manipulations of the restrictive interventions were introduced with explicit examples. We used a 3 (no/low/high time restriction) × 3 (core/ordinary/no functionality restriction) factorial design. First, the low/high time restrictions were manipulated as relatively long or short valid period for free trial (e.g. 30 to 60 days' trial versus 10 days' trial). Second, the core functionality was manipulated as features that clearly characterize the specific software, e.g. image effect transformation function of the image editing software. In contrast, the ordinary functionality was manipulated as commonly known and encountered features, such as the save or export functions. By excluding the condition of both restrictive interventions' absence, there were in total 8 combinations of the two types of restrictive interventions indicated to respondents in the survey, as Table 1 depicts.

Table 1. Factorial Design

Time Restriction (TIMERES)	**Functionality Restriction (FUNCRES)**		
	Core	***Ordinary***	***Absence***
Absence	T1	T2	N/A
Low	T3	T4	T5
High	T6	T7	T8

Measures

As far as possible, verified questions from prior research were adapted to measure constructs with 7-point Likert scale in the current study. To enhance validity, one unlabeled and one labeled sorting session were performed by recruiting six IS postgraduate students each. Minor modifications were made to address the concerns raised by these judges. One exception is that the measurements for the overall effort construct were composed in a hypothetical way

for respondents to predict how much effort they would like to spend. It is done by assuming that the user's behavior will be consistent with his/her preliminary intentions and overall effort devoted will determine the perceived effort. The measurements for each construct are shown in Table 2.

Table 2. Operationalization of Constructs		
Constructs	**Indicators**	**Sources**
Disconfirmation on Time Restriction (DISTIME)	1. Compared to my initial expectation, the _____ (treatment on time restriction) related with this FTS is: from Much Worse than Expected, Neutral to Much Better than Expected. 2. Compared to my initial expectation, the _____ (treatment on time restriction) designed for this FTS is: from Much Worse than Expected, Neutral to Much Better than Expected.	Bhattacherjee and Premkumar (2004)
Disconfirmation on Functionality Restriction (DISFUNC)	1. Compared to my initial expectation, the _____ (treatment on functionality restriction) related with this FTS is: from Much Worse than Expected, Neutral to Much Better than Expected. 2. Compared to my initial expectation, the _____ (treatment on functionality restriction) designed for this FTS is: from Much Worse than Expected, Neutral to Much Better than Expected.	Bhattacherjee and Premkumar (2004)
Expected Value of FTS (EXPVAL)	1. This FTS will be an excellent offer for testing the product. 2. This provided FTS will be able to represent a fair offer to me. 3. This FTS will be able to support extensive evaluation by well representing the commercial version. 4. Generally speaking, this FTS will be worth my effort.	Grewal et al. (1996)
Attitude toward Firm (ATTFIRM)	1. I think the software firm who provided this FTS can attract customers. 2. The software firm who provided current FTS makes me pleasant. 3. My feelings toward the software firm who provided current FTS are generally positive. 4. I am fond of the software firm who provided current FTS.	Kim et al. (1996); Richins (1997)
Perceived Effort on FTS Evaluation (EFFORT)	1. I will likely conduct extensive and thorough evaluation of this FTS. 2. I will likely try my best to evaluate this FTS by making use of the existing facilitations. 3. I will likely use and test this FTS with great effort. 4. I will likely try my best to assess this FTS as fully as possible. 5. I will likely devote a lot of time to assess this FTS.	Pham (1996)
Perceived Resource Accessibility (RESACC)	1. It will likely be difficult for me to get sufficient time to evaluate the FTS during the valid period. 2. I probably will not have much spare time to spend on testing the FTS.	Taylor and Todd (1995)
Perceived Switching Cost (SWICOST)	1. Giving up the current software product represented by this FTS to look for new one would be costly. 2. Generally speaking, the cost in time, effort and future dissatisfaction would be high by switching to other software products which may be better than this FTS. 3. In general, the cost of not using the current software product represented by this FTS would be high. 4. Overall, I would spend a lot of time and effort if I were to switch to other software products which may be better than this FTS.	Heide and Weiss (1995)
Dispositional Innovativeness (DISINNO)	1. If I heard about other new software products, I would look for ways to experiment with it. 2. Among my peers, I am usually the first to try new software products. 3. I like to experiment with new software products.	Agarwal and Prasad (1998)
Inertia (INERTIA)	1. I am reluctant to take action to try new software product if I have tried a similar product already. 2. I will tend to omit action to try new software product if I have tried a similar product already. 3. I would rather accept the software product I have tried than continuing to try another other similar software product. 4. In general, I avoid taking action to change the current situation.	Butler and Highhouse (2000)

Respondents and Incentives

Students in a local public university were invited to the online survey through email or a posted notice on a centralized course Web sites. The purpose of the survey was explained in the invitation letter, and respondents were asked to enter survey Web page by clicking on the URL link in the message. Ten of all the respondents were offered 20 dollars through lucky draw as incentive to participate in the survey. In total, 302 respondents participated in the survey, and they were randomly assigned to one of the eight treatments. Two hundred seventy-five complete records were kept for statistical analysis.

Data Analysis and Results

Mplus (version 4.0), a statistical modeling program, was adopted for data analysis for several reasons (Muthén and Muthén 2006). First, Mplus can perform latent variable mixture modeling while it supports various observed variables or their combinations (e.g. continuous and categorical) and different data types (e.g. cross-sectional and longitudinal). This makes Mplus suitable for handling manipulated constructs. Second, it is a flexible tool with a wide choice of models, estimators and algorithms to simultaneously test the measurement model and structural model. This will provide a more complete analysis to reflect the interrelationships in the model. Third, Mplus can analyze multi-level structural equation modeling when continuous data may not be conditionally multivariate normal. Based on its impressive analytical power, we believe Mplus is suitable for this study.

Control and Manipulation Check

Manipulation checks were performed to confirm that respondents took the restrictive interventions in the treatment into account when answering questions. Those with time/functionality restrictions were asked to specify their imagined time/functionality restriction the scenario. Respondents who provided significantly inconsistent answers with the treatment assigned to them (e.g. imaging 30 days' trial for a high time restriction treatment) were dropped from subsequent analysis. After this check, 262 valid data sets were kept; the number of respondents in each treatment ranges from 26 to 37, with an average between 34 and 35. The demographic information is shown in Table 3.

Table 3. Demographics (n = 262)

Demographic Variables	Category	Frequency (percentage) /Mean (std dev.)	Demographic Variables	Category	Frequency (percentage) /Mean (std dev.)
Gender	Male Female	162 (61.8%) 100 (38.2%)	Age	19 and below 20 – 24 25 – 29	12 (4.6%) 180 (68.7%) 70 (26.7%)
Programme	Undergraduate Master PhD Others	189 (72.1%) 24 (9.2%) 37 (14.1%) 12 (4.6%)	Post-Trial Software Purchase Experience	Yes No	30 (11.5%) 232 (88.5%)
FTS Usage Experience	Less than twice 3 to 4 times 5 to 6 times 7 to 8 times 9 to 10 times 11 to 15 times Above 15 times	81 (30.9%) 56 (21.4%) 44 (16.8%) 14 (5.3%) 15 (5.7%) 8 (3.1%) 44 (16.8%)	Online Purchase Experience for last year	Below 10 times 10 to 29 times 30 to 39 times Above 70 times	229 (87.4%) 28 (10.7%) 4 (1.5%) 1 (0.4%)
Computer Proficiency Skills	1-7 Likert scale 1 as very poor 4 as modest 7 as absolutely expert	4.9618 (1.14071)	Internet Usage	1-7 Likert scale 1 as Rarely (e.g.1-2 times a month) 4 as Modest (e.g.1-2 times a week) 7 as Frequently (e.g. many times a day)	6.6221 (0.85229)

To ensure random assignment of respondents to the eight treatments in the survey, several one-way ANOVA tests were performed as control checks. All statistical tests were performed based on a 5-percent significance level. Results show no significant difference among eight treatments in terms of gender ($F = 0.322$, p = ns), age ($F = 0.816$, p = ns), faculty ($F = 0.709$, p = ns), degree ($F = 0.525$, p = ns), Internet usage ($F = 1.682$, p = ns), online purchase experience ($F = 1.326$, p = ns), computer proficiency ($F = 0.571$, p = ns), prior FTS usage experience ($F = 1.202$, p = ns), post-FTS software purchase experience ($F = 0.430$, p = ns).

Two one-way ANOVA tests further indicate significant correlations between time restriction and disconfirmation on time restriction ($F = 34.349$, $p < 0.01$), and between functionality restriction and disconfirmation on functionality restriction ($F = 40.791$, $p < 0.01$). In Figure 2, the disconfirmation on time and functionality restriction both decrease with the level of restriction. Levels 1, 2 and 3 of time restriction refer to no time restriction, low time restriction and high time restriction respectively. The 1-3 level of functionality restriction refers to no functionality restriction, ordinary functionality restriction and core time restriction. The plot depicts that the combination of low time restriction and no functionality restriction will cause the least disconfirmation on restrictions, and thus is most favorable to respondents. These results indicated successful manipulation of the treatments.

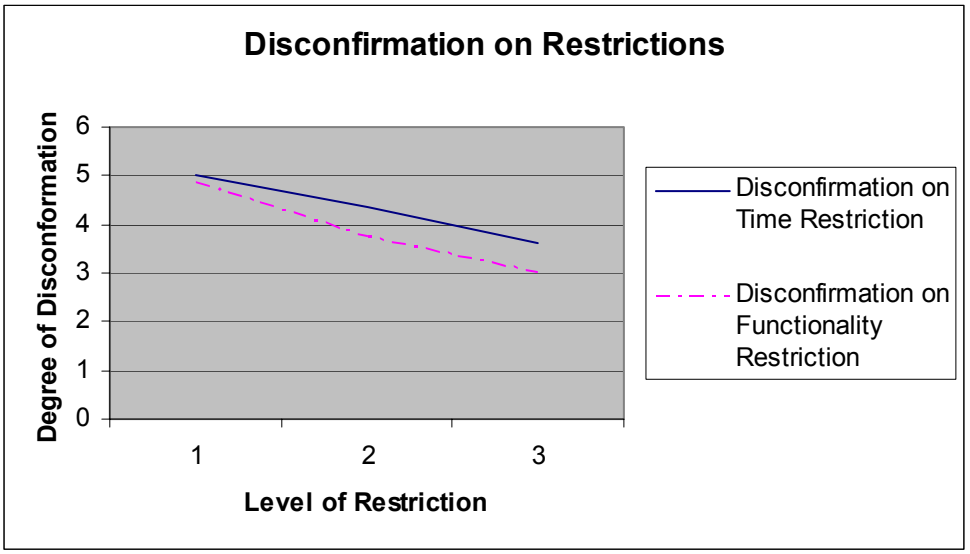


Figure 2. Disconfirmation on Time/Functionality Restriction

Testing the Measurement Model

The measurement model was evaluated by examining the convergent validity and discriminant validity of the research instrument. The convergent validity was assessed by computing the reliability of indicators, composite reliability of constructs, Cronbach's Alpha and the average variance extracted (Hair et al. 1998). Results are shown in Table 4. All indicators in this study had reliability scores above 0.55 (Falk and Miller 1992), while most indicators had reliability scores above 0.707 which means adequate reliability. Composite reliabilities of constructs with multiple indicators exceeded the Nunnally's (1978) criterion of 0.70. The Cronbach's alphas were all higher than the required 0.70 (Nunnally 1978). The average variances extracted by constructs were all above the recommended threshold of 0.50 (Hair et al. 1998). Thus, the convergent validity was established.

To test discriminant validity, factor analysis incorporating all the indicators was first conducted. As Table 5 shows, all the indicators measuring each construct loaded more highly on the intended construct than on other constructs (Thompson et al. 1991). Second, the squared root of the shared variance between a construct and its measures should be greater than the correlations between the construct and other constructs in the model (Igbaria et al. 1994). Through comparison, Table 6 shows that the diagonal values were all higher than those of the non-diagonal elements. Thus, all constructs fulfilled the requirement of discriminant validity.

Table 4. Results of Tests on Convergent Validity				
Constructs and Indicators	Reliability of Indicators	Composite Reliability	Cronbach's Alpha	Average Variance Extracted
DISTIME		0.940	0.870	0.887
DISTIME1	0.9419			
DISTIME2	0.9417			
DISFUNC		0.938	0.866	0.883
DISFUNC1	0.9466			
DISFUNC2	0.9323			
EXPVAL		0.922	0.882	0.747
EXPVAL1	0.8034			
EXPVAL2	0.8578			
EXPVAL3	0.8904			
EXPVAL4	0.9013			
ATTFIRM		0.903	0.857	0.700
ATTFIRM1	0.7761			
ATTFIRM2	0.8624			
ATTFIRM3	0.8935			
ATTFIRM4	0.8086			
EFFORT		0.927	0.902	0.718
EFFORT1	0.8097			
EFFORT2	0.8506			
EFFORT3	0.8767			
EFFORT4	0.8700			
EFFORT5	0.8279			
RESACC		0.899	0.794	0.816
RESACC1	0.8437			
RESACC2	0.9596			
SWICOST		0.860	0.784	0.607
SWICOST1	0.6951			
SWICOST2	0.8419			
SWICOST3	0.7777			
SWICOST4	0.7955			
DISINNO		0.850	0.736	0.654
DISINNO1	0.7658			
DISINNO2	0.7874			
DISINNO3	0.8692			
INERTIA		0.915	0.877	0.730
INERTIA1	0.8264			
INERTIA2	0.8336			
INERTIA3	0.8808			
INERTIA4	0.8762			

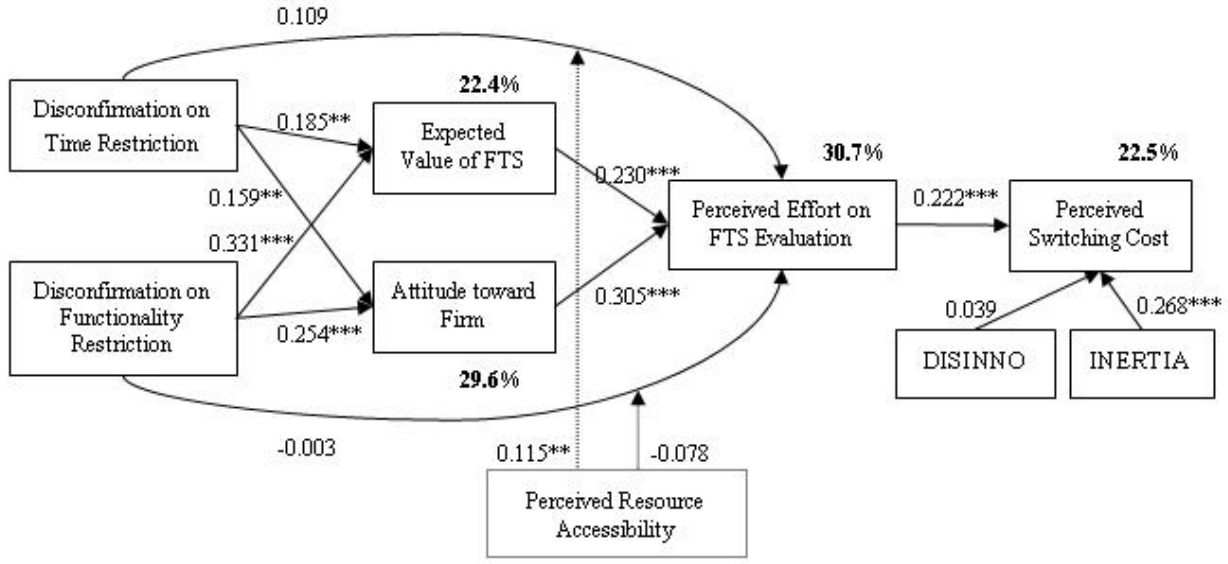
Table 5. Results of Factor Analysis									
	Factor								
Indicators	***1***	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9***
DISTIME1	.176	.011	.129	.060	.018	.075	.053	**.899**	-.118
DISTIME2	.098	.020	.064	.167	.129	.019	.070	**.910**	-.059
DISFUNC1	.136	.044	.124	.194	.068	-.074	**.884**	.081	.056
DISFUNC2	.145	.044	.140	.098	.080	-.064	**.887**	.044	.023
EXPVAL1	.221	.056	**.792**	.129	.144	-.057	-.018	.093	.015
EXPVAL2	.193	.031	**.761**	.209	.152	.022	.164	.096	-.027
EXPVAL3	.250	.124	**.762**	.281	.103	.025	.104	.061	.198
EXPVAL4	.245	.040	**.766**	.322	.127	.110	.134	.006	.070
ATTFIRM1	.096	-.023	.251	**.800**	.018	-.057	.032	.113	-.086
ATTFIRM2	.173	.054	.385	**.658**	.248	.015	.185	.053	.015
ATTFIRM3	.216	.093	.181	**.795**	.183	-.020	.144	.191	.024
ATTFIRM4	.387	.091	.270	**.629**	.224	.130	.117	-.078	.013
EFFORT1	**.685**	.023	.166	.304	.189	.039	.090	.041	-.017
EFFORT2	**.837**	.005	.158	.081	.066	.056	.002	.141	.040
EFFORT3	**.879**	.003	.156	.108	.013	-.008	.072	.058	-.010
EFFORT4	**.867**	-.033	.145	.102	.067	.076	.048	.056	-.004
EFFORT5	**.734**	-.009	.217	.094	.144	.080	.165	.063	-.135
RESACC1	-.018	.013	.076	-.010	.037	-.022	.045	-.103	**.892**
RESACC2	-.060	.001	.060	-.028	.062	.036	.021	-.052	**.902**
SWICOST1	.039	.004	.157	.177	**.717**	.112	-.042	.011	-.011
SWICOST2	.010	.174	.210	.108	**.799**	-.014	.033	.066	.068
SWICOST3	.109	.124	.089	.018	**.760**	-.049	.136	.093	.026
SWICOST4	.251	.171	-.080	.116	**.692**	.051	.047	-.069	.044
DISINNO1	.204	.235	-.023	.040	-.030	**.706**	-.213	-.000	.072
DISINNO2	-.001	-.013	.040	.018	.032	**.830**	.062	.052	-.030
DISINNO3	.034	-.095	.067	-.044	.074	**.854**	-.041	.028	-.071
INERTIA1	.086	**.859**	.057	-.045	.037	-.051	.012	.005	.053
INERTIA2	.044	**.854**	-.011	.020	.076	.057	-.059	-.010	-.029
INERTIA3	-.111	**.833**	.045	.098	.172	.071	.019	.014	-.006
INERTIA4	-.042	**.828**	.105	.021	.158	-.011	.132	.029	.002

Table 6. Discriminant Validity of Constructs									
	DISTIME	***DISFUNC***	***EXPVAL***	***ATTFIRM***	***EFFORT***	***RESACC***	***SWICOST***	***DISINNO***	***INERTIA***
DISTIME	**0.942**								
DISFUNC	0.178	**0.939**							
EXPVAL	0.247	0.330	**0.864**						
ATTFIRM	0.283	0.370	0.642	**0.836**					
EFFORT	0.275	0.281	0.497	0.491	**0.847**				
RESACC	-0.169	0.069	0.127	-0.004	-0.049	**0.904**			
SWICOST	0.143	0.155	0.363	0.338	0.307	0.152	**0.779**		
DISINNO	0.093	-0.112	0.105	0.062	0.152	0.012	0.110	**0.809**	
INERTIA	0.049	0.097	0.157	0.148	0.032	0.030	0.285	0.067	**0.855**

Testing the Structural Model

After establishing the validity of the measures, we assessed the structural paths in the research model by applying SEM technique using Mplus. Figure 2 depicts the structural model including all significant variables. The structural model could explain 22.4 percent of the total variability of expected value of FTS, 29.6 percent of attitude toward firm, 30.7 percent of perceived effort and 22.5 percent of perceived switching cost. The hypotheses are validated

according to size, sign and significance of the path coefficient (see Table 7). In total, 8 out of 11 hypotheses were supported, while each path coefficient was with expected sign and significance above 0.05 level. The exception is the hypothesized negative relationships between the two types of disconfirmation on the time/functionality restriction and the perceived effort. H4b as one of the moderating effect was not supported. For control variables, dispositional innovativeness was found to be insignificant in influencing perceived switching cost, and inertia had significant positive effect on perceived switching cost.



**Significant at 0.05 level ***Significant at 0.01 level

Figure 3. Results of Mplus Analysis

Table 7. Results of Hypothesis Testing

Hypothesis	Coefficient	P	Outcome
H1a: DISTIME to EXPEVAL	0.185	<0.05	Supported
H1b: DISFUNC to EXPEVAL	0.331	<0.01	Supported
H2a: DISTIME to ATTFIRM	0.159	<0.05	Supported
H2b: DISFUNC to ATTFIRM	0.254	<0.01	Supported
H3a: DISTIME to EFFORT	0.109	ns	Not Supported
H3b: DISFUNC to EFFORT	-0.003	ns	Not Supported
H3c: EXPEVAL to EFFORT	0.230	<0.01	Supported
H3d: ATTFIRM to EFFORT	0.305	<0.05	Supported
H4a: RESACC on DISTIME to EFFORT	0.115	<0.05	Supported
H4b: RESACC on DISFUNC to EFFORT	-0.078	ns	Not Supported
H5: EFFORT to SWICOST	0.222	<0.01	Supported

Discussion and Conclusion

Discussion of Results

This study investigates the effects of disconfirmation on time and/or functionality restriction in the FTS usage context from a user's perspective. Consistent with the reactance theory, the results show that the disconfirmation on

restrictive interventions of the FTS will positively influence users' attitudinal responses, including the expected value of FTS and the attitude toward the firm that designs the restrictions. In turn, the more positive the attitudinal responses, the greater one's perceived effort devoted to evaluate the FTS will be. Furthermore, users' perceived switching cost related to giving up the current FTS will increase with the perceived effort devoted to evaluating the FTS. However, the disconfirmation on both types of restrictions was not found to negatively influence perceived effort. Instead, the disconfirmation on time restriction positively influenced the perceived effort while positively moderated by the user's perception of accessible resource such as spare time. The disconfirmation on functionality restriction has no significant influence on the perceived effort with an insignificant moderating effect of perceived resource accessibility.

One plausible explanation for the unsupported direct negative relationship between disconfirmation and perceived effort is that the user may envisage other plausible alternatives in the software market to substitute for the current FTS and, hence, will less likely to stick with the FTS as the only option. By holding to such a belief, the user may regard focusing on the current FTS as unwise. In this light, the user will prefer looking for other FTS products as a means to indirectly restore the trial freedom. Thus, the effort to be spent on the trial depends on the facilitation of the FTS, while more positive disconfirmation will motivate the user to engage more as a direct behavioral response. Under this explanation, the positive relationship between disconfirmation on time restriction and perceived effort is more obvious. Accordingly, greater perceived accessible resource in terms of spare time adds more assurance on the allowed trial time and more confidence to devote effort; thus, a positive moderating effect was found. In contrast, FTS users tend to do even less to counter the situation of restricted functionalities since they favor convenient ways to test software, such as a direct test compared with a time-consuming information search from a third party. Similarly, more free time perceived to be available will not increase the influence of disconfirmation on functionality restriction, with an unsupported moderating effect.

Although direct impacts were not found, the disconfirmation still could impact the perceived effort indirectly. The occurrence of reactance effect under negative disconfirmations could influence the expected value of FTS and one's attitude toward the firm, and vice versa for positive disconfirmation. It suggests that the user's behavioral response will more likely be influenced by attitudinal responses first. For example, when restriction on functionality is stronger than expected, the foremost reaction for the user is to modify evaluations toward the FTS and the software firm, followed with taking actions to counter to the situation.

The perceived switching cost related with switching from the current FTS increases with the perceived effort devoted and the user's inertia to change. Users appear to take into account the spent time and cognitive effort when making a product shift decision. Change of software product can make the user feel loss of knowledge learned and waste of effort. The personal trait of inertial drives them to keep the obtained offer and avoid the future loss of trying new software products. However, dispositional innovativeness has no effect on perceived switching cost, probably because no matter how one likes trying new products, the learning cost spent on the specific product has occurred and will be calculated rationally to decide continuous usage.

Limitations

Before we discuss on the study's implications, it is imperative that we highlight some of the limitations of this study. First, due to its preliminary nature, the research model was tested through conducting an experimental survey. Respondents were presented a scenario to imagine possible reactions and future judgment on effort and switching cost. This method may limit the generalizability of the findings, since respondents did not get a real FTS to use and answer questions after trial period. The perceived effort and switching cost could only be measured in an anticipated way, which may not be realistic enough to extend to general situations. Second, respondents were students from a local public university that represent a subpopulation of potential FTS users. Although previous research has argued no significant difference between students and other subpopulation groups in information technology (IT) usage, there should be differences when this study is applied to more general population, e.g. including working personnel. Thus, we plan to conduct a future field experiment with a real FTS specifically designed with certain restrictions for participants to try. Participants will be extended to different groups of constituents with different demographics.

Implications

Notwithstanding the limitations, we believe this research is unique in the FTS context and will, hopefully, contribute to the existing literature. Theoretically, we apply both the PRT and EDT to analyze trial users' attitude and behavior

under specific trial situations (i.e., restricted free trial). Distinguished from traditional product trial and previous FTS studies, this research concentrates on examining the typical FTS features of restrictions rather than the mere presence of a product trial (e.g. Kempf and Smith 1998) or designing optimal FTS quality through mathematical modeling (e.g. Tang 2003). The research model in this study also differentiates itself from other IS theories (e.g. TAM) by emphasizing individuals' responses toward specific negative stimulus related to the target IT product. Results enable us to gain insights that a user's attitudinal and behavioral responses will change corresponding to different restrictive interventions. Further, behavioral responses in the form of devoting effort in evaluation can be influenced by attitudinal responses, including expected FTS value and attitude toward the software firm. Thus, the reactance theory has been validated and enriched with more specific constructs in the FTS context, as recommended by Brehm and Brehm (1981), while assisted by the EDT. Under the assumption that the free trial will be important for IT product adoption and purchase, we believe this research model can be applied to a variety of trial-related IT application contexts. For the unsupported direct influence of restriction disconfirmation on perceived effort, there is need for future research to explore the reactance effect on behavioral responses more intensively.

Practically, our research can provide implications and guidance to software firms. The results can help firms improve marketing performance by leveraging the benefits of restrictive interventions, i.e., adopting the combination of the restrictions that can maximally reduce disconfirmation and increase trial users' motivation to try. The knowledge related to the effects of one's FTS value evaluation and attitude toward a firm can further help firms reduce the negative impacts from restrictions by presenting additional interventions to improve users' attitudinal responses. By understanding a target user's thoughts, behavior, and anticipations, firms will more likely conduct and adjust marketing and product promotion activities more effectively to attract potential purchasers. As a first attempt to study FTS usage, this research is believed to illuminate practitioners significantly to deliver appropriate interventions during the free trial process, which can effectively increase users' willingness to try and a firm's future profit.

Conclusion

FTS will continue to play an important role in attracting potential buyers for the paid software. This study highlights the effects of restrictive interventions on users' responses in terms of maximizing the advantages of FTS and minimizing its negative impacts. The findings in this study can contribute to further understanding of users' FTS behaviors and practical effectiveness to foster post-trial software purchase.

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